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Managing sustainable development with management control systems: A literature review

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ABSTRACT

The purpose of this article is to synthesize evidence of management control systems (MCS) that are employed by organizations to enforce sustainable development (SD). We aim at suggesting a roadmap for coherent research.

For this, we conduct a 'systematic' review based on an initial sample of 12,139 sources between 1988 and 2013. We then discuss 83 empirical studies in natural and social sciences. The MCS framework of Malmi and Brown (2008) ensures a comprehensive understanding of SD enforcement in practice.

We identify diverse types of controls that organizations use to enforce SD. Our findings problematize examples where the MCS is unable to appropriately address all relevant aspects of SD. We find that organizations prefer to manage and control smaller aspects of SD, such as environmental responsibility. Social responsibility is addressed less frequently, and only few organizations implement a sustainable MCS (SMCS) that addresses all aspects of SD. Classic 'cybernetic' controls are the preferred choice in MCS, but organizations have advanced beyond them during the past decade.

Our main contribution is a structured map of contemporary research that points to areas where our understanding of SMCSs is still scarce, such as their interplay with contextual factors and the resulting, long-term performance effects.

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1. Introduction

The subject of sustainable development (SD) has entered popular discourse since the impacts of the industrial development. Issues such as changes in climate, exhaustion of natural resources, and growth in inequality have become increasingly apparent (Epstein & Roy, 2001; Montiel, 2008; Nixon, Burns, & Jazayeri, 2011). This has led to new regulations and pressure from stakeholders (Rodrigue, Magnan, & Boulianne, 2013). It has also created revenue opportunities, which organizations attempt to seize by implementing and communicating sustainability strategies (Bebbington, 2001; Bouten & Hoozée, 2013; Figge & Hahn, 2013). Nevertheless, SD remains only a good intention, unless organizations make serious efforts to enforce it. An increasing number of researchers suggests that management control systems (MCS) are essential for fostering the integration of SD with its social, environmental, and economic dimensions (e.g., Ball & Milne, 2005;

Covaleski, EvansLuft, & Shields, 2006; Durden, 2008; Gond, Grubnic, Herzig, & Moon, 2012; Norris & O'Dwyer, 2004; Stacey, 2010). MCS have their roots in the management control literature (e.g., Anthony, 1965) and comprise a wide array of mechanisms for directing employees' behavior toward organizational objectives (Merchant and Van der Stede, 2011). Rosanas and Velilla (2005) argue that MCS can also create an illusion of control, and that cybernetic controls are not sufficient anymore for attaining goals beyond profits. As a result, sustainability management control systems (SMCS) have become one of the emergent themes in the management control literature (e.g., Bebbington and Thomson, 2013; Contrafatto & Burns, 2013; Figge & Hahn, 2013).

However, research on SMCS remains fragmented in relation to definitions, theoretical perspectives, and performance effects. While diverse approaches offer valuable insights, they fail to provide a coherent picture of SD and its pertinent controls for enforcement (Gond et al., 2012). Nixon and Burns (2012) and Berry, Coad, Harris, Otley, and Stringer (2009) call for more studies of MCS applied in practice. This should enable researchers and practitioners to be more reflective about the design, use, and appropriate contexts of SMCS for SD (Norris & O'Dwyer, 2004). The purpose of

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this paper is to identify, analyze, and synthesize evidence to answer the related research question: “Which management control systems do organizations apply to manage and evaluate sustainable development?”

We conduct a systematic literature review to ensure validity and conclusiveness (Cooper, 1982; Tranfield, Denyer, & Smart, 2003). In order to contribute to practice-oriented research, we concentrate on empirical studies that focus on SMCS. We cast our net widely across literature from the social science, natural science, and interdisciplinary fields. We identify 83 studies published in 56 journals from the inauguration of SD in 1988 until 2013. We synthesize the literature with the MCS framework by Malmi and Brown (2008), which comprises diverse controls as one package.

We find that there are various types of SMCS in practice, and that far more studies were conducted on an environmental than a social or sustainability dimension. Yet, very few of these SMCS achieve a consistent link from SD to financial rewards and other kinds of compensation in contemporary organizations. Neither is there a single type of control that could ensure full enforcement. Instead, multiple controls seem to be required to reinforce each other. Traditional accounting-based MCS are not capable of addressing all aspects of SD and would require an adaptation (Ball & Milne, 2005). We find that the interplay of SMCS and their context is not as well understood as in other areas of MCS, and there is little evidence on the performance effects of SMCS. As a common pitfall in organizations, these MCS can even create dysfunctional trade-offs between social, environmental, and economic objectives instead of seizing their synergies (Byrche, Kearins, Milne, & Morgan, 2007). Last, we conclude that the link between conceptual and empirical contributions on SMCS is weak.

We first contribute to the literature by extending the MCS framework by Malmi and Brown (2008) and make it applicable to SD. Second, we uncover areas that have received limited attention and warrant future research. This includes the questionable transferability of findings from the environmental to the social dimension (and vice versa); an investigation of the context surrounding appropriate SMCS, such as industry or global region; their effect on SD/economic performance; as well as a better understanding of the interaction between different types of sustainability controls. Third, we discuss possible advancements in methodology, particularly challenging the overreliance on cross-sectional surveys and case studies.

The remainder is organized as follows: Section 2 presents the interface of SD and MCS. The research design is illustrated in Section 3. We then present a descriptive (Section 4) and a content (Section 5) analysis of the literature. Section 6 synthesizes future research opportunities. Section 7 outlines the implications for practice and academia as well as the review's limitations.

2. Conceptual background

2.1. Sustainable development

The concept of SD has attracted increasing attention over the last two decades (Bansal, 2005; Dyllick & Hockerts, 2002; Epstein, Buhovac, & Yuthas, 2012; Hopwood, Mellor, & O'Brien, 2005; Moon, 2007; Redclift, 2005), but has not been unambiguously defined (Bell & Morse, 2008; Carroll, 1999). One of the most prominent definitions was given by the World Commission on Environment and Development (WCED, 1987, p. 8) that view a development as sustainable when it “meets the needs of the present without compromising the ability of future generations to meet their own needs”. Inherent is the aim of balancing the environmental, social, and economic dimension equally, which Elkington (1994) summarizes as the *triple bottom line*. These three dimensions are

interdependent and can reinforce each other (Bansal, 2005).

Organizations often engage in SD to pursue a resource-based strategy and to respond to institutional demands. In the first case, SD is considered as a strategic intangible asset which is adopted to improve performance and to create opportunities from innovations and internal changes (Bebbington, 2001; Fisher, 1995; Hamoudah, Sulaiman, Alwi, & Abideen, 2013; Nixon et al., 2011). Pelozo (2009) finds that 59% of the 128 academic articles assessed suggest a relationship between adopting a measure of social/environmental performance and financial performance. The review of Aguinis and Glavas (2012) uncovers that SD creates positive non-financial outcomes at the institutional, organizational, and individual level. However, such aggregated verdicts remain controversial due to a missing consensus on measures for the respective performance, differences in defining responsibility, and measurement errors (Linnenluecke & Griffiths, 2010; Meyer, 1994; Orlitzky, Schmidt, & Rynes, 2003; Otley & Berry, 1980; Roth, 2008). In the second case, organizations act in a social context and experience pressure from stakeholders. In order to keep access to resources and to uphold legitimacy, organizations attempt to comply with stakeholders' norms and beliefs. For this, organizations adopt SD that becomes institutionalized through regulations and agreements (Bansal, 2005; Deegan, 2002; Epstein & Roy, 2001; Pelozo and Shang, 2011).

Various terms are used synonymously for similar concepts, e.g., sustainability, sustainable business, and corporate (social) responsibility (CSR) (Ebner & Baumgartner, 2006; Naudé, 2012). Yet, it is not only the terminology that impedes a common understanding, but the diverse application that creates different meanings across various contexts (Bebbington, 2001; Hopwood et al., 2005; Milne, Tregidga, & Walton, 2009; Redclift, 2005; Velázquez Gomar and Stringer, 2011). Due to the mixture of terms, meanings, and the scarce details given in the reviewed literature, we cannot be certain to what extent the definition by WCED (1987) is being followed. Since we aim at conducting a comprehensive review of the literature, we refer to SD for any concept that addresses the three dimensions of ecological integrity, social responsibility and economic prosperity.

2.2. Management control systems for sustainable development

An organization and its employees initially have divergent aspirations about the objectives to aim for. This is due to employees' diverse personalities, motivations, lack of direction, behavior, and personal limitations (Merchant, 1985). To align overall objectives, management employs MCS which are complete “systems, rules, practices, values and other activities management put in place in order to direct employee behavior” (Malmi & Brown, 2008, p. 290). MCS consist of formal and informal controls. Formal controls are contractual obligations that comprise rules, performance evaluation, reward criteria, and budgeting systems to control results through feedback and feed forward loops (Langfield-Smith, 1997; Norris & O'Dwyer, 2004). Informal controls comprise beliefs, shared values, norms, cultures, traditions, and self-control. They are less visible and might not be deliberately designed means to direct employees' attention to organizational objectives. Nevertheless, informal controls are seen as being at least as effective as formal ones (Flamholtz, Das, & Tsui, 1985; Langfield-Smith, 1997; Ouchi, 1979; Stacey, 2010).

Research on the interface of sustainability and MCS is an emerging theme (Berry et al., 2009). It is restrained by tension between the traditional understanding of MCS and the goals of sustainability: The former has its focus on growth and profitability through increasing efficiency at the cost of increasing resource depletion. SD is yet concerned with the maintenance of natural

resources. Organizations that aim to enforce SD alter the notion of traditional management control. Ball and Milne (2005, p. 324), conclude that “*new ideas and tools for management control [...] are essential in the context of a shift towards sustainability*”. These would be the SMCS we mentioned above.

To shed light on the application of SMCS in practice, we adopt a holistic perspective on controls. Traditional MCS studies focus on few aspects of control which resulted in unclear findings and divergent conclusions (Covalesski et al., 2006; Ferreira & Otley, 2005; Otley, 1999). An alternative is to understand controls as a ‘package’ (Malmi & Brown, 2008) where components can be designed and applied by different individuals, and they do not necessarily need to be aligned (Malmi, 2013; Malmi & Brown, 2008). This reveals the subtle linkages and interdependences between its various components which in turn helps us to better understand the effects of various controls on behavior (Abernethy & Brownell, 1999; Chenhall & Langfield-Smith, 2003; Ferreira & Otley, 2005; Fisher, 1998; Macintosh & Quattrone, 2010). It is controversial if MCS are a ‘package’ (Malmi & Brown, 2008), a unified ‘system’ (Grabner & Moers, 2013) or independent social ‘practices’ (Ahrens & Chapman, 2007). Hence, our review is open to studies rooted in any of these paradigms.

We use the framework by Malmi and Brown (2008) whose broad foundation diminishes the threat of model under-specification. This framework goes beyond cybernetic controls and covers informal and formal controls. In addition, it allows study of internal and external contingencies that influence the design and implementation of MCS (Broadbent & Laughlin, 2009). It can also be used to assess the application of MCS across hierarchical levels. In the following, we give an introduction to each of the five controls and their sub-sets based on the relevant conceptual literature that discusses these controls with the specific SD perspective.

1. The rather stable [1] *cultural controls* embrace the set of [1a] *values*, [1b] *symbols*, and [1c] *social norms* within ‘*clans*’ that are shared by members of an organization. These controls enclose and direct the other control systems. Linnenluecke and Griffiths (2010) identify various important barriers and limitations for sustainability-related cultural changes and make suggestions for successful change processes.
2. *Planning* exerts control by involving employees in [2a] *long-range* and [2b] *action planning*. It raises probability that they assume accountability which generally improves results (Meyer, 1994). We note that strategic planning is a necessary antecedent of measuring performance against the intended goals.
3. As part of performance measurement, [3] *cybernetic controls* are used to achieve accountability of employees for deviations in performance. They include [3a] *budgets*, [3b/c] *(non-)financial measurement systems*, and [3d] *hybrid systems*. Several authors discuss the result-driven controls with a sustainability perspective. Roth (2008) argues that budgets can be valuable means of communicating SD objectives throughout the organization. The literature review of sustainability accounting by Schaltegger and Burritt (2010) indicates that suggestions from research are overly conceptual and have not yet produced feasible results in practice (similar: Owen, 2008; Parker, 2011). In particular, purely accounting-related control applications for SD such as full cost accounting have not yet left the conceptual stage (Bebbington, Brown, & Frame, 2007; Figge & Hahn, 2004). Researchers have difficulties coping with the complexity of SD when translating it into measurable indicators used in accounting (Gray, 2010). Various authors suggest modifications of the BSC by Kaplan and Norton (1992) toward SD (e.g., Dias-Sardinha et al., 2002; Epstein & Wisner, 2005; Figge, Hahn, Schaltegger, & Wagner, 2002; Hubbard, 2009; Möller &

Schaltegger, 2005; Nikolaou & Tsalis, 2013; Panayiotou, Aravossis, & Moschou, 2009). Moreover, Searcy (2011) discusses the integration of sustainability into a comprehensive performance measurement system (PMS).

4. *Reward and compensation systems* aim to motivate individuals or groups to attain organizational goals (Malmi & Brown, 2008). Reward systems for sustainable performance are examined by Dutta and Lawson (2009) and Goetz (2010). They argue for an easy-to-understand PMS where organizational goals directly align with rewards.
5. *Administrative controls* consist of [5a] *governance structures*, [5b] *organization structures*, and [5c] *policies and procedures*. The study of Kocmanová, Hrebíček, and Dočekalová (2011) suggests that corporate governance can give organizations the structure necessary to reach sustainability goals and objectives.

3. Research design

Research often selects certain aspects of SCMS, even though SMCS consist of various interrelated control systems (Grabner & Moers, 2013). Thus, only few links between interrelated topics are established. In order to present a comprehensive picture of the current state of SMCS, we conduct a *systematic review* (Denyer & Tranfield, 2009; Rousseau, Manning, & Denyer, 2008; Tranfield et al., 2003). We take a multistep search approach to identify the seminal works in this area.

In a first step, we performed 151 bibliographic database searches in Business Source Complete (EBSCO) and Science Direct (SCID) to identify interdisciplinary publications of social and natural sciences. We set the period of publication from January 1988 to July 2013. Due to the diverse terminology on SMCS, we used different search strings and the asterisk as a wild card within the title, abstract, and keyword searches. The search strings were a combination of MCS (or a more specific control system) and the different responsibility perspectives. The initial search resulted in 12,139 hits. After examining their titles, we deemed 728 articles relevant.

Secondly, we performed a cursory analysis of the 728 abstracts and introductions. We eliminated 422 duplicates and 132 articles that did not pass our inclusion criteria, which are: [A] the article must deal with SD; articles covering only the environmental or social dimensions were accepted as well to ensure a comprehensive overview. [B] The article addresses controls in for-profit and/or non-profit organizations. [C] We concentrated on contributions that examine controls. [D] We considered only peer-reviewed English-language journals. This left us with 174 articles.

In step three, we scanned the 174 full texts and discarded 42 papers that did not include empirical data. We eliminated another 77 empirical articles when we realized that they did not meet our above inclusion criteria, e.g., in terms of covering controls. 55 articles remained.

In a fourth step, we applied the “*ancestry approach*” suggested by Cooper (1982). This ensured inclusivity beyond the initial search in English-language journals. We followed selected references of the 55 empirical studies listed by Google, Scopus, and Social Science Citation Index. On that basis, we included books and working papers that met the inclusion criteria. In cases where the contribution was published outside of peer-reviewed journals, we considered the previous contributions of the respective author. If the author had published in leading journals before, the newly identified source qualified to be considered in the review. The ancestry approach yielded 50 additional publications that the database search had failed to reveal. After eliminating the conceptual literature, we ended up with 83 empirical studies for further analysis. We kept monitoring the literature through table-of-content alerts after July 2013 to stay up-to-date, and used the relevant studies in

the discussion section of this review.

We coded the relevant literature in a qualitative content analysis which allowed for an analysis of qualitative sources in a quantitative manner (Fakis, Hilliam, Stoneley, & Townend, 2014). In each source, we searched for SMCS applications and matched them to the framework of Malmi and Brown (2008). Based on an inductive coding approach, we established subcategories of control application. We tested the reliability of the categorization process by referring to the article of Malmi and Brown (2008) and to some of the literature which Herremans, Nazari, and Ingraham (2010) use to classify control systems, such as Falkenberg and Herremans (1995), Kloot (1997), Merchant and Van der Stede (2011), Norris and O'Dwyer (2004), and Starbuck (1992). In cases where the coding definitions varied too much or the control application could not be identified as such, we looked for control applications that shared similar control mechanisms, for example the application of policies and codes of conduct.

Our analysis contributes beyond previous reviews. Compared to Aguinis and Glavas (2012), we cover literature beyond the specific term CSR and investigate not only adoptions but how they are controlled. Beyond the review of Crutzen and Herzig (2013), we investigate how SD is controlled, not the relationship of SD to control and strategy. We consider fields beyond business, include meso- and macro-perspectives, and review 83 instead of 27 studies. This enables us to contribute to the literature, e.g., by eventually discovering “research that is solely dedicated to social sustainability issues” (as demanded by Crutzen & Herzig, 2013, p. 179). We build on Crutzen and Herzig (2013, p. 183) list of questions for future research by prioritizing crucial aspects, proposing concise research designs, and linking them to literature from related fields.

4. Descriptive analysis: trends and characteristics of the literature

We analyze the frequency and characteristics of the 83 studies in Fig. 1. Panel A shows that publications on controlling SD have only been increasing in the past 10 years. The grey bubbles indicate that the first publication on comprehensive SMCS is as recent as the year 2000. This recently emerging importance of SMCS is in line with the observations of Parker (2011).

Panel B reveals that more than three quarter of the relevant literature is published in social science journals. In particular, most contributions originate from business within the subfields of management and finance & accounting. Specifically in the U.S., control-related research tends to be published as general management, besides accounting (e.g., Kaplan & Norton, 1992; Simons, 1994). Only 14% of the contributions come from natural or interdisciplinary sciences. This might indicate that SMCS are approached from the MCS side (Carenys, 2010), and social and environmental responsibility is added. However, it is up to debate if the social sciences possess sufficient knowledge of social and environmental issues to capture the whole SD concept.

Panel C shows that approximately 40% of the relevant literature explicitly relates to the concept of SD ($n = 33$), and 19% to CSR ($n = 16$). We note some arbitrariness in definitions: e.g., in 3 cases, SD is reduced to environmental concerns. Almost half (41%) of the literature refrains from applying a coherent concept but refers to selected dimensions, i.e., environmental, social, or economic. A relative majority of studies (37%) focuses just on environmental responsibility, which confirms the findings of Adams and Frost (2008) that the development of social indicators was lagging behind.

According to Panel D, most studies on SD use samples from Europe and North America. Research that takes a holistic control approach with SMCS mostly uses European and multi-national samples (not shown). Hence, the increasing importance of SMCS

in developing and emerging countries is not yet reflected.

5. Content analysis: the use of controls for sustainable development

54% of the empirical studies report that SD is controlled by corporate performance management (cf. Fig. 2) which makes this sub-type of a cybernetic control the most common. The most frequently reported main type of control for SD is administrative controls (70%). Each type of control suggested by Malmi and Brown (2008) has been identified by empirical research which validates the suitability of their framework in practice. The dominance of cybernetic and administrative controls might be driven by the fact that organizations had already employed them to measure financial performance. They extended them to SD without considering other forms of control. This effect might partly be reinforced by researchers with incentives to highlight formalized controls in order to be accepted in the relevant journals (esp., finance & accounting). In the following, we discuss our qualitative content analysis of the five control types and map the seminal works by methodology and main findings.

5.1. Cultural controls for sustainable development

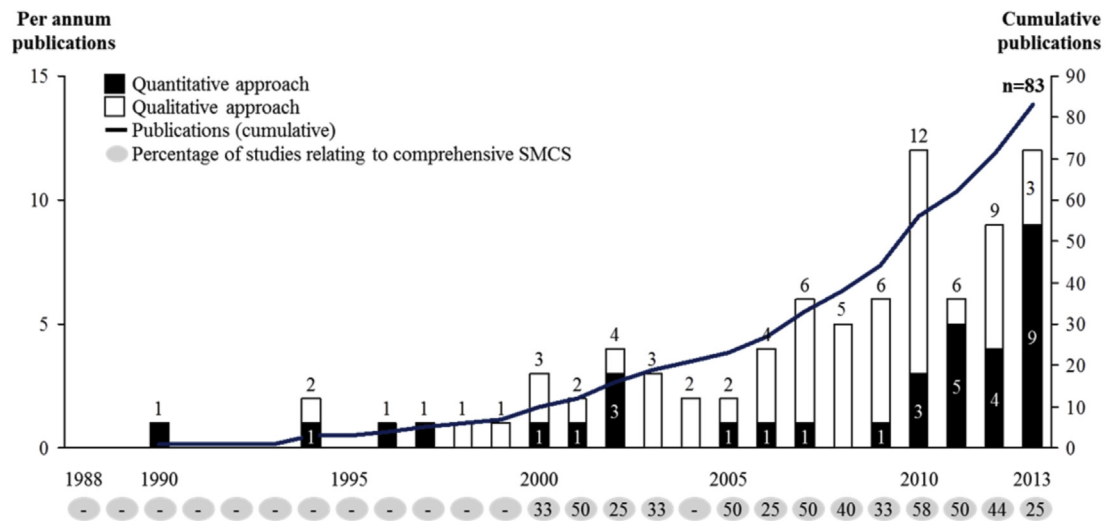
SD is integrated into culture through initiatives, communication, and engagement by top management and employees (Clarke & Roome, 1999; Knox & Maklan, 2004; Lee, Park, & Lee, 2013; Marshall & Brown, 2003; Morsing & Oswald, 2009). A gradual inclusion of SD into corporate culture avoids resistance from employees who could have felt overwhelmed by radical change and discontinuity of traditional behavior (Riccaboni & Leone, 2010). From a locus of control perspective, cultural controls are most powerful (Falkenberg & Herremans, 1995; Forte, 2005) as they provide the basis for understanding SD and the formal control mechanisms (Cramer, Van Der Heijden, & Jonker, 2006; Rosanas & Velilla, 2005; Van der Heijden, Driessen, & Cramer, 2010). The operationalization of social and environmental initiatives could provide such a strong, common identity based on ethics, morality, and responsibility that employees are intrinsically motivated to strive for social and environmental goals (Costas & Kärreman, 2013). This directing power of ‘self-actualization’ is confirmed by Graves, Sarkis, and Zhu (2013). Cultural controls can even reach beyond the boundaries of an organization by using suppliers’ formal consent to a joint code of conduct (Lueg, Clemmensen, & Pedersen 2015). Yet, the diffusion of cultural controls in practice is disputed (Crutzen, Zvedov, & Schaltegger, 2013). While Jabbour (2011) finds a high level of application, Fairfield, Harmon, and Behson (2011) and Arjaliès and Mundy (2013) attest a low application. This disagreement might be related to the fact that Jabbour (2011) surveys only ISO 14001 adopters (adverse selection), Fairfield et al. (2011) focus on organizations with diverse backgrounds, and Arjaliès and Mundy (2013) examine publicly listed organizations that self-selected their exposure to shareholder pressure.

5.2. Planning for sustainable development

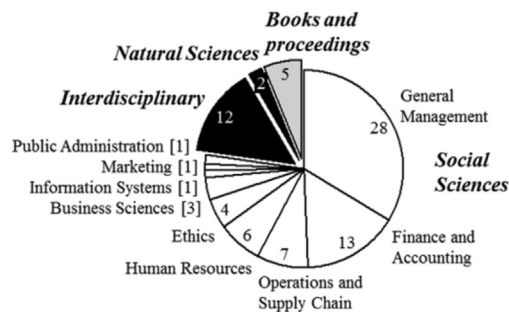
Organizations striving for SD include short-term and long-term sustainability objectives in their local and centralized planning processes (Arjaliès & Mundy, 2013; Epstein & Roy, 2001; Pérez, Ruiz, & Fenech, 2007). Conveying sustainability through objectives provides meaningful direction and can lower employees’ resistance to them (Holton, Glass, & Price, 2010). Studies with samples from North America (Henri & Journeault, 2010), Europe (Crutzen et al., 2013; Maas & Reniers, 2014; Pérez et al., 2007), and

Panel A: frequency and methodology of empirical studies 1988–2013 (n=83)

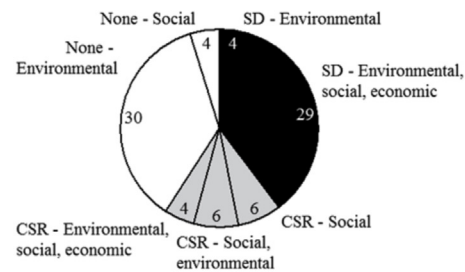
Absolute and in per cent

**Panel B: Sources of studies**

Journals by discipline & other; in per cent

**Panel C: Concepts applied in studies**

By concept [SD, CSR, none]; in number of studies

**Panel D: Geographic location of studies**

By continent; in per cent

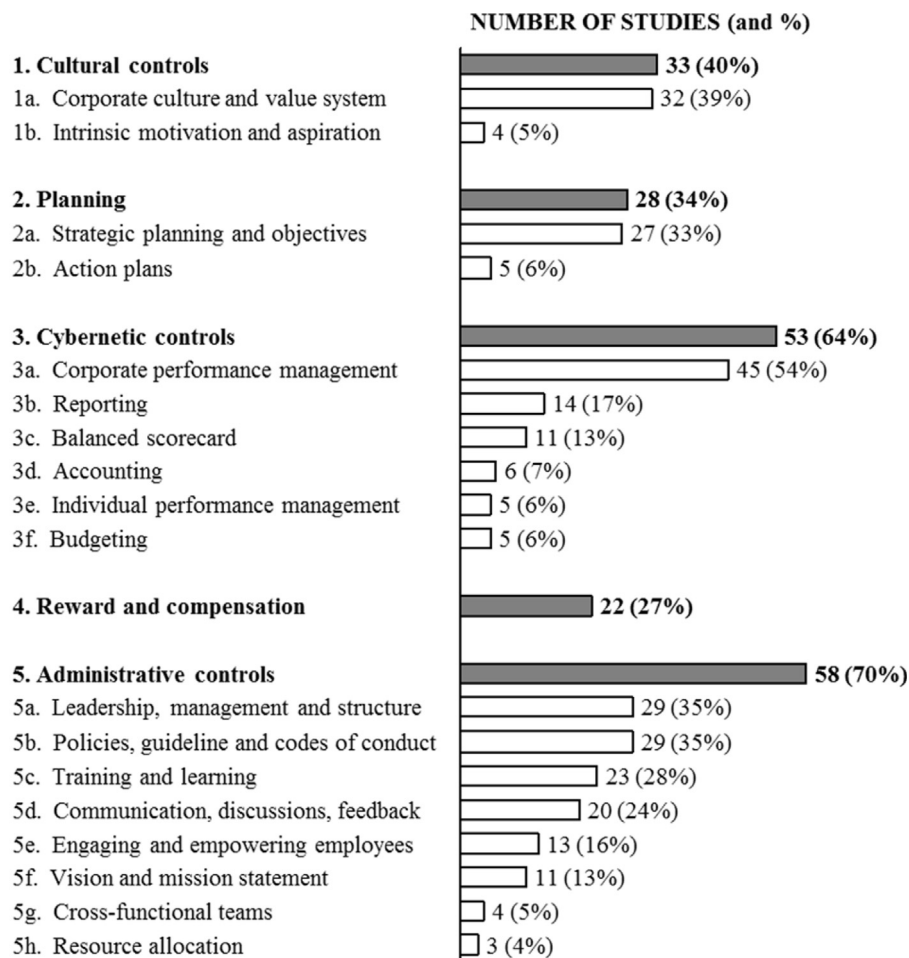
**Fig. 1.** Frequency and characteristics of empirical studies 1988–2013 (n = 83).

Africa (Urban & Govender, 2012) indicate a high level of application, which may be contingent on the respective industry (Banerjee, 2002) and organizational factors such as management commitment (Wisner, Epstein, & Bagozzi, 2006). It might not always be necessary to re-invent an organization's business model to pursue SD: business and responsibility goals just have to be somehow linked during the planning phase (Banerjee, 2002; Eccles, Perkins, & Serafeim, 2012; Epstein & Roy, 2001). The integration of SD in the planning process fails if SD planning is done with systems traditionally used for financial planning (Riccaboni & Leone, 2010), if specific action plans are not established (Clarke & Roome, 1999;

Durden, 2008), or if strategic planning is not adapted to local circumstances (Adams & Frost, 2008; Arjaliès & Mundy, 2013).

5.3. Cybernetic controls for sustainable development

Cybernetic controls are widely applied for SD at the organizational level in Europe (Arjaliès & Mundy, 2013; Crutzen et al., 2013; Passetti, Cinquini, Marelli, & Tenucci, 2014). In contrast, Jamali, Safieddine, and Rabbath (2008) report that none of the organizations they studied in the Middle East systematically measured the social impacts. Jabbour (2011) states that environmental



Counts are not mutually exclusive; article can refer to more than one control application.

Fig. 2. Frequency of control applications (n = 83).

performance assessment is prominent in all Brazilian ISO 14001 organizations. This is in line with the conjecture that a proactive environmental strategy is linked to high sophistication of SMCS (Brown, 1996; Perego & Hartmann, 2009; Wisner et al., 2006). In addition, industry and public listing have a positive influence on the level of SD incorporation which is likely due to the demand to publish such information for stakeholders (Dias-Sardinha et al., 2002; Gates & Germain, 2010). The high popularity of cybernetic controls (Fig. 2) might implicate that these controls are most important for SD. However, the majority of contributions acknowledge that cybernetic controls should be accompanied by further controls to become an effective SMCS (Ball & Milne, 2005; Garrety, 2008; Rosanas & Velilla, 2005). The strength of an SMCS is notably determined by the interplay of diverse control systems which is explicitly elaborated by Herremans et al. (2010), Morsing and Oswald (2009), Norris and O'Dwyer (2004), and Perron, Côte, and Duffy (2006). There are two commendable case studies (Morsing & Oswald, 2009; Riccaboni & Leone, 2010) and three quantitative studies (Arjaliès & Mundy, 2013; Crutzen et al., 2013; Lisi, 2015) that provide detailed reports on using entire control systems to enforce SD. However, there are only few attempts to make a *comprehensive* analysis of the dynamic relationships inherent in an SMCS.

To eventually evaluate performance, organizations must

establish measures and targets. Traditional indicators are seldom adequate to measure SD (Eccles et al., 2012). Therefore, organizations derive indicators from existing standards, such as the Global Reporting Initiative (Arjaliès & Mundy, 2013), or develop new measures. A first common problem with this is that centrally defined key performance indicators (KPIs) may be challenged in other geographic regions because SD may be interpreted differently, or the KPIs disregard regional context. Second, the development of social and economic KPIs can lag behind the establishment of environmental KPIs (Adams & Frost, 2008). Third, the optimal approach to develop KPIs varies with an organization's size and complexity (Searcy, Karapetrovic, & McCartney, 2008). Eventually, information on performance management can be published in internal reports and provide direction to employees in their daily work (Adams & McNicholas, 2007; Morsing & Oswald, 2009).

Overall, we identify three major types of cybernetic controls. First, Bartley et al. (2012) present a flexible budgeting system to assess environmental indicators. Second, the Sustainable Balanced Scorecard with an environmental perspective is discussed by Lämsiluoto and Järvenpää (2010), Dias-Sardinha, Reijnders, and Antunes (2007), and Morsing and Oswald (2009). Such MCS should be integrated into existing performance management to avoid a decoupling and a subtle shift of focus toward traditional systems (Pedersen & Neergaard, 2008). However, Crutzen (2011) finds that

all seven organizations studied used sustainability and traditional PMS separately. A third approach is sustainability accounting (Passetti et al., 2014; Taplin, Bent, & Aeron-Thomas, 2006).

5.4. Reward and compensation for sustainable development

Organizations link reward and compensation to SD to ensure accountability (Ramus, 2002) and to influence decision making (Merriman & Sen, 2012). Campbell, Johnston, Sefcik, and Soderstrom (2007) find that managers ask for higher compensation if risk arises from environmental underperformance or non-compliance, and for lower compensation if they can control risk exposure. Incentives for meeting SD targets are not that common (Arjaliès & Mundy, 2013; Fairfield et al., 2011). This is also the case when organizations focus only on environmental issues (Jabbour, 2011). Reasons are the lower prioritization of SD compared to the main business strategy, the assumption that financial performance reflects SD, and difficulties in assigning responsibilities. As a notable exception, Epstein and Wisner (2005) report from an organization where more than three-quarters of non-managerial, non-environmental staff are integrated into an SD compensation scheme. Yet at same time, only 16% of the non-environmental managers were eligible for rewards. While it might be sensible to incentivize managers as well, Mackenzie (2007) finds that managers choose among SD objectives opportunistically, depending on the optimal input-reward-relationship.

5.5. Administrative controls for sustainable development

The literature states that top management commitment raises awareness, provides a vision of SD goals (Morsing & Oswald, 2009; Petrini & Pozzebon, 2010; Stoughton & Ludema, 2012) and assures legitimacy (Lee, 2009). Setting up new organizational structures reinforces the priority of SD and emphasizes the need to overcome traditional behavior (Petrini & Pozzebon, 2010; Riccaboni & Leone, 2010). Atkinson, Schaefer, and Viney (2000) and Quinn and Dalton (2009) state that there is no single structure that fits all organizations. Yet, centralization is more likely to be found in larger organizations (Aldama, Amar, & Trostianki, 2009; Arjaliès & Mundy, 2013). The new structure should be supported by transparent communication, formal statements (i.e., mission statements, policies, and codes of conduct) and change agents to convey the seriousness of top managements' SD concerns (Arjaliès & Mundy, 2013; Cramer et al., 2006; Morsing & Oswald, 2009; Ricart, Rodríguez, & Sánchez, 2005; Van der Heijden et al., 2010). Lauring and Thomsen (2009) state that all relevant organizational members should be involved in establishing policies.

Training and learning support the appreciation of these policies (Dechant & Altman, 1994; Haugh & Talwar, 2010; Petrini & Pozzebon, 2010) and are important control mechanisms for changing behavior toward SD (Holton et al., 2010). Quinn and Dalton (2009) conclude that employees do not have to believe in SD as long as there are education and communication in place to encourage sustainable behaviors. Wagner (2011) tracks the importance of training over time and finds that relative importance of training as a control element decreased among successful SD adopters. Contrary, Jabbour (2011) reports that the majority of respondents agree that continuous environmental training is an important means for environmental management. These studies are examples of research fragmentation where results are not comparable due to differences in time, geography, industry, and partly concepts.

Last, resource allocation can direct management's focus onto the barriers that SD faces (Hallstedt, Ny, Robèrt, & Broman, 2010). Engaging employees is a widespread practice among sustainable

organizations (Eccles et al., 2012). It drives changes in behavior: as soon as employees are convinced that their contribution benefits society and the environment, they require fewer other controls (Wirtenberg, Harmon, Russell, & Fairfield, 2007).

5.6. Interactions of controls for sustainable development

Malmi and Brown (2008) highlight that ineffective MCS may not be ineffective per se, but that a misfit among control types can be the source of the problem. Accordingly, the investigation of SMCS as a package reveals important links between the individual control sub-systems (Grabner & Moers, 2013). A general prerequisite for effective SMCS is that organizations must define SD, or at least help their employees make sense of the term (Bebbington & Gray, 2001). Otherwise, employees are forced to attach their own interpretation to SD, which might differ widely from the objectives of the organization (Durden, 2008). Herremans et al. (2010) find evidence of the interplay between formal and informal controls. They state that the credibility of reporting on SD is related to the enforcement of controls. Organizations need to be careful in aligning formal and informal controls since the more powerful informal controls may overrule the formal ones (Norris & O'Dwyer, 2004). Tensions among controls are especially bound to occur when organizations do not define them well (Durden, 2008; Norris & O'Dwyer, 2004; Riccaboni & Leone, 2010). Crutzen et al. (2013) do not find that any of their 17 case organizations adopt informal and formal control systems equally. Relationships between controls were found from top management commitment to sustainability performance measurement (Parisi, 2013), from transformational leadership to intrinsic motivation (Graves et al., 2013), between cultural controls and training (Perron et al., 2006), and between planning and cybernetic controls (Morsing & Oswald, 2009). Two studies focus on contingency factors that influence the entire SMCS. Dkhili and Noubbigh (2013) state that environmental uncertainty increases the focus on social aspects and non-financial indicators. With respect to environmental responsibility, Pondeville, Swaen, and De Rongé (2013) conclude from a survey that formal environmental controls are less frequently employed when perceived environmental uncertainty is high. The authors suppose that formalized controls are not flexible enough in uncertain environments. Table 1 maps the seminal studies by control type and methodology (qualitative or quantitative).

6. Synthesis: discussion and future research opportunities

Our literature review uncovers avenues for future research on which we elaborate in the following.

6.1. Strengthening the link from theory into practice

Research on SMCS emerges from different ontological and epistemological perspectives. This leads to a wealth of case descriptions, but results in few comparable, consecutive studies. The current link between conceptual and empirical literature on SMCS is relatively weak. It is only the conceptual literature by Figge et al. (2002) and Hubbard (2009) which are discussed by Lämsiluoto and Järvenpää (2010), Moore (2013) who builds on structuration theory, and the contribution by Schaltegger and Burritt (2010) which influences the work by Arjaliès and Mundy (2013). Future research could strengthen the link between conceptual SMCS literature and empirical case studies. Applying theoretical concepts in empirical studies might support the step from describing toward explaining the phenomenon of enforcing SD. Practitioners would benefit from a more explicit link between practices and theoretical claims on SD, such as motivating and rewarding sustainable behavior and

Table 1
Mapping of seminal works by methodology and main findings.

Cultural controls	qual	<ul style="list-style-type: none"> In-depth case studies concerning culture and values: <i>Application</i> (Clarke & Roome, 1999; Holton et al., 2010; Knox & Maklan, 2004; Marshall & Brown, 2003; Morsing & Oswald, 2009; Riccaboni & Leone, 2010); <i>Sense making of sustainability</i> (Cramer et al., 2006; Van der Heijden et al., 2010); <i>Cultural framing</i> (Howard-Grenville & Hoffman, 2003; Lueg et al., 2015) Aspirational control/intrinsic motivation (Costas & Kärreman, 2013)
	quant	<ul style="list-style-type: none"> Frequency of application (Arjaliès & Mundy, 2013; Crutzen et al., 2013; Fairfield et al., 2011; Jabbour, 2011) Performance relationships of culture and values: <i>Cultural fit as predictor</i> (Lee et al., 2013) Performance relationships intrinsic motivation: <i>Intrinsic motivation as mediator</i> (Graves et al., 2013)
Planning	qual	<ul style="list-style-type: none"> In-depth case studies concerning planning: <i>Application</i> (Pérez et al., 2007); <i>Breaking resistance</i> (Holton et al., 2010); <i>Coordination function</i> (Clarke & Roome, 1999) Planning tools: <i>Inappropriate systems</i> (Durden, 2008; Riccaboni & Leone, 2010)
	quant	<ul style="list-style-type: none"> Frequency of application (Arjaliès & Mundy, 2013; Crutzen et al., 2013; Henri & Journeault, 2010; Maas & Reniers, 2014; Pérez et al., 2007; Urban & Govender, 2012) Performance relationships: <i>Planning as outcome</i> (Banerjee, 2002); <i>Planning as mediator</i> (Wisner et al., 2006)
Cybernetic controls	qual	<ul style="list-style-type: none"> In-depth case studies concerning cybernetic controls: <i>Application</i> (Pedersen & Neergaard, 2008; Riccaboni & Leone, 2010); <i>KPIs development</i> (Adams & Frost, 2008; Eccles et al., 2012; Keeble et al., 2003; Maas & Reniers, 2014) Specific measurement tools: <i>Internal sustainable reporting</i> (Adams & McNicholas, 2007; Morsing & Oswald, 2009; Searcy et al., 2008); <i>Flexible budgeting</i> (Bartley et al., 2012); <i>Sustainable Balanced Scorecard</i> (Dias-Sardinha et al., 2007; Lämsiluoto & Järvenpää, 2010; Morsing & Oswald, 2009); <i>Sustainability accounting</i> (Bebbington & Gray, 2001; Lamberton, 2000; Taplin et al., 2006)
	quant	<ul style="list-style-type: none"> Frequency of application: <i>Corporate performance measures</i> (Arjaliès & Mundy, 2013; Brown, 1996; Crutzen et al., 2013; Jamali et al., 2008; Wisner et al., 2006); <i>Individual performance measures</i> (Jabbour, 2011); <i>Specific measurement tools</i> (Aldama et al., 2009; Crutzen, 2011; Ricart et al., 2005) Performance relationships: <i>Performance measurement as outcome</i> (Dias-Sardinha et al., 2002; Perego & Hartmann, 2009); <i>Sustainability reporting as outcome</i> (Gates & Germain, 2010)
Reward and compensation	qual	<ul style="list-style-type: none"> In-depth case studies concerning reward and compensation: <i>Influence on decision making</i> (Merriman & Sen, 2012); <i>Incongruence of control systems</i> (Mackenzie, 2007)
	quant	<ul style="list-style-type: none"> Frequency of application: <i>Reward and compensation</i> (Arjaliès & Mundy, 2013; Fairfield et al., 2011; Ramus, 2002); <i>Compensation scheme</i> (Epstein & Wisner, 2005) Performance relationships: <i>Reward and compensation as outcome</i> (Campbell et al., 2007)
Administrative controls	qual	<ul style="list-style-type: none"> In-depth case studies concerning application of: <i>Top management support</i> (Lee, 2009; Morsing & Oswald, 2009; Petrini & Pozzebon, 2010; Stoughton & Ludema, 2012); <i>Organizational structure</i> (Aldama et al., 2009; Atkinson et al., 2000; Petrini & Pozzebon, 2010; Quinn & Dalton, 2009; Riccaboni & Leone, 2010); <i>Written statements</i> (policies, etc.) (Haugh & Talwar, 2010; Laurant & Thomsen, 2009); <i>Training and learning</i> (Dechant & Altman, 1994; Holton et al., 2010; Perron et al., 2006; Petrini & Pozzebon, 2010; Quinn & Dalton, 2009); <i>Resource allocation</i> (Hallstedt et al., 2010); <i>Employee engagement</i> (Morsing & Oswald, 2009; Wirtenberg et al., 2007)
	quant	<ul style="list-style-type: none"> Frequency of application: <i>Training</i> (Jabbour, 2011; Morris, 1997); <i>Training</i> (development over time) (Wagner, 2011); <i>Organizational structure</i> (Arjaliès & Mundy, 2013); <i>Employee engagement</i> (Eccles et al., 2012)
Interrelation of controls	qual	<ul style="list-style-type: none"> Relationship among different SMCS: <i>Formal and informal control systems</i> (Herremans et al., 2010; Norris & O'Dwyer, 2004); <i>Cultural and administrative control systems</i> (Norris & O'Dwyer, 2004; Perron et al., 2006); <i>Planning and cybernetic control systems</i> (Morsing & Oswald, 2009)
	quant	<ul style="list-style-type: none"> Frequency of application: <i>Informal and formal controls</i> (Crutzen et al., 2013) Performance relationships: <i>Cybernetic and administrative control systems</i> (Parisi, 2013); <i>Cultural and administrative control systems</i> (Graves et al., 2013); <i>SMCS as outcome</i> (Dkhili & Noubbigh, 2013; Pondeville et al., 2013)

Qual: Qualitative Research Approach; quant: Quantitative research approach.

planning, and facilitating double-loop learning and dynamic capabilities (Burritt & Schaltegger, 2010; Lisi, 2015; Perego & Hartmann, 2009). Also, it would advance SMCS beyond the prevalent cybernetic understanding.

As to the applied responsibility concepts, Fig. 1 (Panel C) depicts that environmental concepts outweighs social and sustainability concepts. Moreover, the literature indicates that both organizations and researchers struggle to define objectives of social responsibility (Fairfield et al., 2011; Norris & O'Dwyer, 2004; Riccaboni & Leone, 2010). In addition, no empirical contribution has explicitly examined the transformation from being environmentally responsible toward full SD. Therefore, we doubt that existing findings can be easily transferred to sustainability cases. Future research could replicate some of the studies on social and environmental MCS from a sustainability perspective to close this research gap.

6.2. Defining performance and measuring the effectiveness of controls

Peloza (2009) finds that 59% (14%) of his 128 reviewed studies report a positive (negative) relationship between financial performance and adopting at least one general CSR-measure. A typical example is testing the link from CEO compensation to social and environmental performance (e.g., Berrone & Gomez-Mejia, 2009; Cordeiro & Sarkis, 2008; Deckop, Merriman, & Gupta, 2006; Mahoney & Thorne, 2005; McGuire, Dow, & Argheyd, 2003). Such

insights are valuable since sophisticated SMCS per se are not a guarantee for better performance (Dias-Sardinha et al., 2007). Our 83 studies are yet largely silent on the relationship of controls and performance, which is why we also consider SMCS-performance studies published after July 2013. Future research could better argue which of the two common types of 'performance' it investigates, and which sub-categories it chooses: *SD-performance* may range from micro factors measuring individual achievements of a manager/department—over meso factors, e.g., achieving Social Accountability 8000 or ISO 14001 certifications—to macro factors that measure improvements in an eco-system or working conditions in an industry (Gray & Milne, 2004; Henri, Boiral, & Roy, 2014; Wood, 2010). *Economic performance* may range from quantifiable, accounting- and market-related organizational measures, over operative KPIs, to qualitative, even subjective measures (Copeland, Koller, & Murrin, 1994; Kaplan & Norton, 2001). Studies face several challenges when assessing the effectiveness of SCMS. These include picking and quantifying the appropriate measures, relating a meaningful benchmark to them, allocating costs and revenues to the accountable manager/unit, and defining different performance measures that correspond to the varying stakeholder demands toward each organizational unit (Bebbington & Gray, 2001; Henri et al., 2014; Keeble, Topiol, & Berkeley, 2003; Lamberton, 2000; Maas & Reniers, 2014).

We found some studies documenting a positive link between environmental performance and planning (Wisner et al., 2006),

administrative controls and compliance (Dasgupta, Hettige, & Wheeler, 2000; Virtanen, Tuomaala, & Pentti, 2013)—specifically employee training (Ji, Huang, Liu, Zhu, & Cai, 2012)—cost control (Henri et al., 2014), and combined controls (Epstein & Wisner, 2005; Graves et al., 2013).

Some studies also report positive effects between *social and environmental* performance with planning (Judge and Douglas, 1998), and combined controls (Henri & Journeault, 2010; Lisi, 2015). Parisi (2013) suggests that social and environmental performance is affected by the *structural* alignment of controls (integration, formalization, and embeddedness), not *social* alignment (i.e., the degree to which middle managers understand SD). Merriman and Sen (2012) discover that middle managers are biased toward selecting SD-initiatives associated with direct incentives. When choosing among equally beneficial projects, test persons systematically overlooked equally high indirect benefits, e.g., the often lauded cost savings from SD.

Even fewer studies test for a link between SMCS and economic performance. Controls appear to affect economic performance through environmental (and social) performance as a mediator variable (Henri et al., 2014; Henri & Journeault, 2010; Judge and Douglas, 1998). While the relationship is not always strong or significant at the 5% level (e.g., Lisi, 2015), one might make the conjecture that comprehensive SMCS can positively affect SD- and economic performance.

Yet, future research can still explore many open issues in the performance effects of SMCS. First, there is no evidence on the role of social performance per se, or comprehensive SD. In the same vein, few studies consider a comprehensive set of controls (exception, e.g., Arjaliès & Mundy, 2013; Crutzen et al., 2013; Lisi, 2015). Second, endogeneity poses a problem to the validity of the performance effects, because adopting SD and the pertinent SMCS is an internal choice of organizations that needs to be accounted for statistically (Ittner & Larcker, 2001; Wooldridge, 2009). However, the almost exclusive use of cross-sectional data shows how hard it is to gather the necessary longitudinal data that could account for endogeneity. Dasgupta et al. (2000) are a commendable example for using a statistical two-stage model that addresses multicollinearity and simultaneity. Third, there is almost no discussion on the lag of performance effects or incurred costs (Wooldridge, 2009): enforcing better working conditions may show instant effects on SD/economic performance. Yet, it may take decades until effects of SMCS on SD/economic performance can be documented, e.g., if the objective is to sustain a regional eco-system. Fourth, current studies do not discuss alternative forms of internal fit for SMCS design/use and their performance effects (Malmi & Brown, 2008). Burkert, Davila, Mehta, and Oyon (2014) and Grabner and Moers (2013) provide guidelines how to systematically improve research designs in this respect from the perspective of contingency theory. Specifically, complementary theory might be of interest, as it investigates interactions of SMCS with other practices/systems in the organization (Ennen & Richter, 2010).

6.3. Accounting for contextual factors and the diffusion process

Future research could explore contextual factors that determine the different sophistication/embeddedness of SCMS. For this, studies could first consider different sophistication levels of controls. Only Pérez et al. (2007) explicitly mention that SMCS can differ in sophistication, even if two organizations apply the same standards. This implies that controls are not necessarily the same, even among members of the Dow Jones Sustainability Index, KDL database, or ISO standards adopters. Milne et al. (2009) address the problem of decoupling SD in some organizations. The authors prompt to differentiate between actual internal practices (SMCS)

and external rhetoric of organizations. This is not common practice in most studies, as most data are obtained through surveys and interviews with informants from mainly marketing and communication departments (exception, e.g., Campbell et al., 2007). Corroboration is often limited to internal material that has been made publicly available, such as responsibility reports or organizational websites (Holton et al., 2010; Lämsiluoto & Järvenpää, 2010). Only few case studies approach employees from different functions and levels for triangulation (e.g., Banerjee, 2002; Lee et al., 2013; Ramus, 2002). Only five studies compare their SD adopters to a control group that has a low level of responsibility initiatives (Brown, 1996; Eccles et al., 2012; Perron et al., 2006; Ramus, 2001; Ricart et al., 2005). Future research could define what comprises sophisticated SMCS. The studies of Burkert and Lueg (2013) and Speckbacher, Bischof, and Pfeiffer (2003) on the different sophistications of Value-based Management and the Balanced Scorecards, respectively, are commendable examples.

Second, research could look at the antecedents of sophistication. A first reason for varying sophistication among organizations could be the implementation phases of SMCS. High sophistication of a practice is generally associated with early adoption for rational-choice reasons (Ansari, Fiss, & Zajac, 2010). Future research could build on diffusion theory and isomorphism to account for dynamic levels of sophistication, and make results more comparable (DiMaggio & Powell, 1983; Robertson, Swan, & Newell, 1996). It would also help practitioners to assess their status in early implementation phases, when 'best practices' of leading organizations may not be applicable. Maon, Lindgreen, and Swaen (2010) synthesize the literature and propose a development process of CSR for future studies. A second reason for different sophistication could be the properties of the organization (endogenous) or its environment (exogenous). For instance, only Gates and Germain (2010), Jabbour (2011), and Baird, Geylani, and Roberts (2012) test for industry differences, even though more than one-third of the literature employs a cross-sectorial sample (Messner, 2015). Adams and Frost (2008) find tensions when incorporating an SMCS in different regions and cultures. This is of particular interest in globalized supply chains (Amaeshi, Osuji, & Nnodim, 2008). Research in fast-growing, resource-consuming emerging markets might reveal the relevance of cultural controls that are less common in Western Europe, such as clans or spirituality (Amaeshi & Amao, 2009; Mensah, 2014; Vitell et al., 2009). Several studies state that external stakeholder pressure, legislation, and top management ambitions lead to the integration of sustainability concerns (e.g., Arjaliès & Mundy, 2013; Gates & Germain, 2010; Holton et al., 2010; Morsing & Oswald, 2009; Taplin et al., 2006) whereas external reporting can be used to communicate initiatives and progress toward SD (Adams & Frost, 2008; Bebbington et al., 2007; Deegan, 2002; Milne et al., 2009). Herremans et al. (2010) investigate this alleged impact on SMCS. They find substantial differences in the design and use of SMCS for sustainability reporting. The authors conclude that SMCS are not only dependent on internal factors but are also shaped by external factors (also cf. Bouten & Hoozée, 2013). Future researchers have many options to theoretically interpret the relationships between practices and their context. This could include theories explaining the performance of systems, such as contingency theory or person-organization-fit theory (Burkert et al., 2014; Chenhall, 2003). Alternatively, it may involve theories that explain the emergence of practices that demonstrate the 'intentionality' to improve performance, such as the family of practice theories (Whittington, 2006) or leadership-related research (Finkelstein & Hambrick, 1996). The applicability of these theories is likely to be dependent on the phase of the SMCS in the diffusion process (Lounsbury, 2008).

Third, we could not find (advanced) replication studies with the same research subject in different contexts or time frames.

Challenging or confirming previous studies would increase the validity in this field of research (Silberzahn & Uhlmann, 2015), and show how the relevance of contextual factors may shift during different implementation phases of SMCS in an organization.

6.4. Taking a longitudinal perspective

There is scant longitudinal evidence on SMCS. Wagner (2011) comes close by conducting two surveys in 2006 and 2011, but there is only little overlap in organizations in the two samples (similar with interviews: Moore, 2013). Other articles take a historical perspective and provide insights into the process of implementing responsibility (e.g., Clarke & Roome, 1999; Marshall & Brown, 2003; Searcy et al., 2008). Only Searcy et al. (2008) consider SD with its full three dimensions. The focus of these studies is limited to the organizational development of cybernetic controls, which leaves research opportunities on how organizations change their MCS to embed sustainability. Rosanas and Velilla (2005) call for more research on the outputs of SMCS and intrinsic rewards. Thereby, we could gain a better understanding of how organizations adapt different types of controls simultaneously, and if they neglect certain controls. Future research could also shed light on the issue of how long it takes to arrive at an implemented SMCS, and how organizations cope with any control vacuum occurring during the transformation toward SD. Last, longitudinal research could investigate if internal SMCS are decoupled from external SD communication. A commendable example of this on shareholder-oriented controls is Fiss and Zajac (2004).

7. Contributions and limitations

This paper addresses the research question: “Which management control systems do organizations apply to manage and evaluate sustainable development?” Based on our systematic literature review of 83 journal, conference and book contributions dealing with environmental, social, or sustainable MCS from 1988 to July 2013, we find that SMCS has attracted increasing attention over the past 10 years. We make several contributions to research and practice.

7.1. Contributions to research

First, we use reproducible criteria to identify 83 seminal studies in the field of SD enforcement, and then structure them by their contributions using the framework of Malmi and Brown (2008). We also contribute by comparing these studies to each other and thereby constructing a comprehensive map of knowledge about this field in both narratives and tabular overviews. Researchers that would like to work in this field, or judge contributions, can profit from our categorizations and highlighted research gaps. We thereby complete other maps of related research, such as the reviews on the general conceptualization of SMCS (Burritt & Schaltegger, 2010; Gond et al., 2012), the conceptualization of SD (Aguinis & Glavas, 2012), contemporary topics on MCS (Berry et al., 2009), SMCS and strategy (Crutzen & Herzog, 2013; Langfield-Smith, 1997), green human resource management (Renwick, Redman, & Maguire, 2013), and the influence of contextual variables on MCS design (Chenhall, 2003).

Second, we advance research by structuring the literature and by suggesting an agenda for future research. Thereby, we can emphasize which areas appear to need more study. For instance, we identify studies that look at individual control applications and SMCS that, however, do not incorporate all dimensions of SD. As to SD, we find that research relates very often to environmental MCS, ignoring social responsibility or the economic perspective. As to SMCS, our analysis indicates that mechanistic

cybernetic controls are still prevailing (lack of *breadth*). Also, there is scarce evidence on SMCS sophistication (*depth*). Furthermore, we do not know a lot about the performance-optimal configurations of SMCS subject to macro/meso/micro level contingency factors, such as national culture, industry, or top management preferences (Forte, 2005; Mensah, 2014; Soltani, 2014). We extend previous literature reviews by specifying the aspects that need more attention and by proposing concise research opportunities with commendable examples. Our assessment identified methodological pitfalls that future research might avoid to increase reliability and validity.

Third, we report on the characteristics (Section 4) and the content (Section 5) of the studies. This uncovers concentrations and white fields of studies regarding the control of SD. We provide an agenda of future research, such as conducting more quantitative and longitudinal studies that are more robust against key informant biases.

7.2. Implications for practice

Organizations are increasingly concerned about SD. Our review offers several insights: First, we provide practitioners with condensed knowledge on contemporary practices and the pitfalls of enforcing SD (Rousseau et al., 2008; Tranfield et al., 2003). The economic effects of SMCS are still an open issue. Yet, existing practices can be assumed to reflect the *intentionality* (Jarzabkowski, 2005) of organizations to improve SD/economic performance. Even though some studies are subject to a certain industry, region, or responsibility concept, findings convey the diversity of controls to align employees' behavior with SD. Also, we offer a map of empirical results where practitioners can identify studies that report on a certain type control.

Second, we heed caution that SD is interpreted quite differently. In order to be effective, top management must provide a clear definition as well as goals of how to create organization-wide consensus. The literature consistently reports that this needs to be supported by awareness trainings and written statements (e.g., Durden, 2008; Holton et al., 2010; Marshall & Brown, 2003; Petrini & Pozzebon, 2010; Ramus, 2002).

Third, traditional methods, particularly cybernetic controls, are not capable of overcoming barriers of SD implementation or to consider all three dimensions. We highlight that SD cannot be enforced with isolated controls but requires an orchestrated system of formal and informal controls to avoid confusion and opportunistic behavior (Adams & Frost, 2008; Bebbington & Gray, 2001; Keeble et al., 2003; Riccaboni & Leone, 2010). The control effectiveness might be limited at the beginning, but it provides the opportunity for organizational learning and to engage employees to find creative solutions (Bartley et al., 2012; Hallstedt et al., 2010; Lämsiluoto & Järvenpää, 2010; Morsing & Oswald, 2009; Pedersen & Neergaard, 2008). In connection with this, the focus should not be set on single controls but on the design of a control orchestra within which each member reinforces the other (Ennen & Richter, 2010), especially with regard to the relationship of informal and formal controls (e.g., Crutzen et al., 2013; Herremans et al., 2010; Norris & O'Dwyer, 2004).

Fourth, organizations experience pressure by stakeholders and legislation, which can be accommodated with SMCS (e.g., Arjalès & Mundy, 2013; Clarke & Roome, 1999; Gates & Germain, 2010; Morsing & Oswald, 2009). In addition, Herremans et al. (2010) argue that external forces, such as regulators, have an impact on internal MCS. Therefore, regulators may put pressure on organizations to foster the incorporation of SD but, at the same time, they should give organizations the necessary time to adapt their SMCS to maintain effective controls.

7.3. Limitations of our work

The findings of the literature review have some limitations. First, despite our systematic approach, transparency is limited by our inherent values and beliefs, which we might not be able to fully express. Second, a systematic review produces a more generalizable theory (Rousseau et al., 2008). Nevertheless, research of social constructs is still limited to moderate generalization (Payne & Williams, 2005). Third, we sought to capture all relevant publications; however, there is the risk of omitting pertinent studies that were in progress or published in sources and languages that were not part of this review. Fourth, even though we tested the reliability of our classification of controls according to the framework by Malmi and Brown (2008) by means of distinguished MCS literature, it is still subject to our personal judgement. Therefore, some controls might have been classified as another MCS type as well.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.emj.2015.11.005>.

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